



# RECOVERY OF RENAL FUNCTION IN LIVER TRANSPLANT ALONE VERSUS COMBINED LIVER KIDNEY TRANSPLANTATION: ANALYSIS FROM THE NHSBT UK REGISTRY

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## OBJECTIVES

Recovery of renal function after liver transplantation is strongly influenced by pretransplant degree and duration of renal insufficiency, despite imprecise methods for measuring renal dysfunction. Indications for combined liver-kidney transplantation (CLKT) have been defined, but these are still under debate and hepatorenal syndrome (HRS) is a particularly challenging condition given the hardly predictable spontaneous improvement with liver transplant alone (LTA).

**Table 1.** Kidney function outcome at 1, 3 and 5 years post-transplantation for patients undergoing LTA compared to CLKT and stratified on the basis of eGFR at transplantation.

|  | LTA<br>(n patients) | CLKT<br>(n patients) | p       |
|--|---------------------|----------------------|---------|
| <b>Stage G3a<br/>(eGFR 59-45 mL/min/m<sup>2</sup>)</b> |                     |                      |         |
|  | (687)               | (6)                  | 0.651   |
| 1y post-LT   | 54 [45-67]<br>(522) | 53 [30-73]<br>(4)    | 0.270   |
| 3y post-LT   | 53 [42-64]<br>(381) | 60 [50-80]<br>(4)    | 0.275   |
| 5y post-LT   | 52 [42-64]          | 67 [46-89]           |         |
| <b>Stage G3b<br/>(eGFR 44-30 mL/min/m<sup>2</sup>)</b> |                     |                      |         |
|  | (294)               | (8)                  | 0.381   |
| 1y post-LT   | 49 [41-60]<br>(207) | 45 [37-55]<br>(7)    | 0.416   |
| 3y post-LT   | 46 [37-61]<br>(146) | 40 [38-52]<br>(5)    | 0.567   |
| 5y post-LT   | 49 [39-61]          | 38 [34-66]           |         |
| <b>Stage G4<br/>(eGFR 29-15 mL/min/m<sup>2</sup>)</b>  |                     |                      |         |
|  | (65)                | (18)                 | 0.500   |
| 1y post-LT   | 51 [34-68]<br>(46)  | 56 [48-61]<br>(14)   | 0.426   |
| 3y post-LT   | 49 [31-65]<br>(31)  | 53 [47-61]<br>(10)   | 0.687   |
| 5y post-LT   | 44 [29-67]          | 52 [38-55]           |         |
| <b>Stage G5<br/>(eGFR &lt;15 mL/min/m<sup>2</sup>)</b> |                     |                      |         |
|  | (9)                 | (12)                 | 0.219   |
| 1y post-LT   | 41 [20-63]<br>(8)   | 60 [45-65]<br>(9)    | 0.321   |
| 3y post-LT   | 39 [21-70]<br>(4)   | 62 [42-66]<br>(7)    | 1.000   |
| 5y post-LT   | 54 [41-113]         | 53 [46-73]           |         |
| <b>RRT patients</b>                                    |                     |                      |         |
|  | (244)               | (63)                 |         |
| 1y post-LT   | 63 [50-80]<br>(162) | 50 [37-67]<br>(47)   | <0.0001 |
| 3y post-LT   | 60 [48-77]<br>(105) | 46 [40-59]<br>(32)   | <0.0001 |
| 5y post-LT   | 61 [49-78]          | 47 [37-56]           | <0.0001 |

## METHODS

We analysed data of 6035 patients (Jan 2001-Dec 2012) from NHSBT UK Transplant Registry. Renal function at 1 year after transplantation was compared between CLKT and LTA with stratification on the basis of glomerular filtration rate (eGFR) at transplant (KDIGO Guidelines) and treatment with renal replacement therapy (RRT). Renal function post-transplantation was classified as eGFR >60, between 59-30 and <30 ml/min/1.73m<sup>2</sup>, the latter identified as non recovery of renal function. Univariate and multivariable analysis were performed to identify possible risk factors of renal function non-recovery.

## RESULTS

### Renal Function after transplantation and renal recovery

Kidney function outcome at 1, 3 and 5 years post-transplantation was considered for patients undergoing LTA compared to CLKT and stratified on the basis of eGFR at transplantation (Table 1). No differences were detected in renal function outcome and renal non-recovery between LTA and CLKT patients for different stratification of renal function at transplant.

Patients on RRT at time of transplantation presented a significantly better renal function when receiving LTA compared to CLKT. This difference is consistent at 1, 3 and 5 years post-transplant.

Non-recovery of renal function (eGFR <30ml/min/1.73m<sup>2</sup>) in patients treated with RRT at time of transplantation was significantly higher in patients receiving CLKT compared to patients receiving LTA (Table 2).

**Table 2.** Recovery of renal function 1 year post-transplantation stratified on the basis of stages of renal function at transplantation.

| eGFR Stages<br>[mL/min/1.73m <sup>2</sup> ] | Renal function<br>recovery | LTA<br>[number of<br>patients] | CLKT<br>[number of<br>patients] | p     |
|---|----------------------------|--------------------------------|---------------------------------|-------|
| <b>G3a</b><br>[59-45]                       | eGFR ≥30                   | 673 (98.0)                     | 5 (88.3)                        | 0.050 |
|   | eGFR ≤29                   | 14 (2.0)                       | 1 (16.7)                        |       |
| <b>G3b</b><br>[44-30]                       | eGFR ≥30                   | 275 (93.5)                     | 7 (87.5)                        | 0.572 |
|   | eGFR ≤29                   | 19 (6.5)                       | 1 (12.5)                        |       |
| <b>G4</b><br>[29-15]                        | eGFR ≥30                   | 53 (81.5)                      | 18 (100.0)                      | 0.140 |
|   | eGFR ≤29                   | 12 (18.5)                      | -                               |       |
| <b>G5</b><br>[<15]                          | eGFR ≥30                   | 7 (77.8)                       | 12 (100.0)                      | 0.154 |
|   | eGFR ≤29                   | 2 (22.2)                       | -                               |       |
| <b>RRT</b>                                  | eGFR ≥30                   | 230 (94.2)                     | 57 (90.5)                       | 0.001 |
|   | eGFR ≤29                   | 14 (5.7)                       | 6 (9.5)                         |       |

### Risk factors for renal function non-recovery

The univariate analysis identified recipient age >50 years, female gender, RRT in patients with MELD >20, polycystic disease and diabetes as predictive factors for non-recovery of renal function in patients undergoing LTA. In the multivariable model including all clinically relevant variables simultaneously, the independent predictors of renal function non-recovery were female gender (HR 2.76; 95% CI 1.52-4.99, p=0.001), RRT in patients with MELD >20 (HR 3.62; 95% CI 1.44-9.08, p=0.006) and diabetes (HR 2.55; 95% CI 1.38-4.73, p=0.003).

## CONCLUSIONS

In our patients, renal function non-recovery does not result different between patients undergoing LTA or CLKT for different stratification of pre-transplant renal function. A significantly higher number of patients non-recovering renal function resulted among patients on RRT before transplantation receiving CLKT. This could be consistent with the hypothesis that the etiology of renal dysfunction pre-OLT is important and that those patients probably experiencing HRS can recover renal function with LTA. Moreover it is likely that renal non-recovery in CLKT may be due to the damage sustained by transplanted kidneys undergoing to CIT during the preservation process.

We identified RRT at time of transplantation, female gender and diabetes as risk factors that negatively affect renal function non-recovery for patients receiving LTA. This may suggest to consider CLKT when these conditions are present, but further studies are deserved to better confirm this hypothesis.

## REFERENCES:

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- Levin A, Stevens P, Bilous R. Kidney Int Suppl Oct 23;Suppl(3):1-150.

